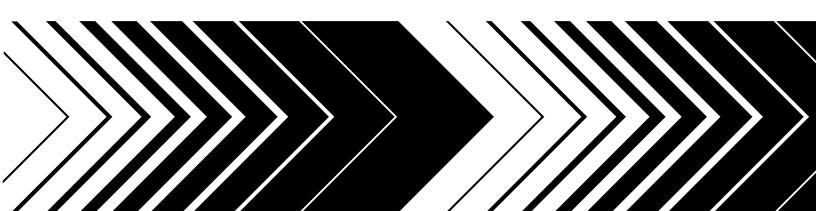


# Human Health Metrics for Environmental Decision Support Tools:

Lessons from Health Economics and Decision Analysis



# HUMAN HEALTH METRICS FOR ENVIRONMENTAL DECISION SUPPORT TOOLS:

# Lessons from Health Economics and Decision Analysis

BY

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E. Timothy Oppelt, Director National Risk Management Research Laboratory

#### **Abstract**

Environmental decision support tools often provide information that predicts a multitude of different human health effects due to environmental stressors. Medical decision making and health economics offer many metrics that allow aggregation of these different health outcomes. This paper provides a review of this literature with special attention to aspects relevant in the environmental context. Based on a characterization of medical and environmental applications, recommendations for the use of human health metrics in different environmental decision support tools have been derived. Further, three metrics (quality adjusted life years (QALYs), disability adjusted life years (DALYs) and willingness-to-pay (WTP)) have been used to compare a wide range of different environmental risk factors. In this example, WTP tends to reflect mortality outcomes only. QALYs and DALYs are sensitive to mild illnesses that affect large numbers of people, which are difficult to assess in an unbiased manner. Since health metrics tend to follow the paradigm of utility maximization, these metrics may be supplemented with a semi-quantitative discussion of distributional and ethical aspects. Finally, the magnitude of age-dependent disutility due to mortality for both monetary and non-monetary metrics may bear the largest practical relevance out of a series of suggested research questions.

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### **Acronyms and Abbreviations**

\$ U.S. Dollar

15D quality of life measurement instrument using 15 attributes (or dimensions)

BCA Benefit Cost Analysis (same as CBA)

CA Conjoint Analysis

CBA Cost-Benefit Analysis (same as BCA)

CEA Cost-Effectiveness Analysis

COI Cost of Illness
CUA Cost-Utility Analysis
CV Contingent Valuation
CVA Cost-Value Analysis
DALYs disability adjusted life years
DC Dichotomous choice format

EPA Environmental Protection Agency (same as USEPA or U.S. EPA)

EUR European currency prior to the introduction of the Euro
EuroQol European Quality of Life measurement instrument

GDP Gross Domestic Product HALYs health adjusted life years

HALYs+ Health Adjusted Life Years with age-weighting

HUI Health Utility Index HYE Health-Years Equivalent

ISO International Standard Organisation

ME Magnitude Estimation O3 (tropospheric) Ozone

OE Open-ended question format

PM10 Particulate Matter smaller than 10µm

PTO Person Trade-Off

QALYs quality adjusted life years
Qm chronic health state
QW Quality Weight
QWB Quality of Well-Being
r risk aversion factor

SEYLL standard expected years of life lost SF36 short form with 36 questions/attributes

SG Standard Gamble

t time

TO Tradeoff Method TTO Time Trade-Off

U.S. EPA United States Environmental Protection Agency

UN United Nations

USEPA United States Environmental Protection Agency UV-A/B Ultraviolet radiation within spectrums A or B

VAS Visual Analogue Scale
VSL Value of a Statistical Live
WHO World Health Organisation
WTA Willingness to Accept
WTP Willingness-to-Pay
YLD Years Lived Disabled
YLL Years of Life Lost

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